

## MESOSIGMOIDITIS, AND ITS RELATIONS TO RECURRENT VOLVULUS OF THE SIGMOID FLEXURE.

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VOLVULUS of the sigmoid flexure has long been known as a pathological and clinical entity. The cases of death caused by this form of intestinal obstruction have been numerous in the days when abdominal surgery had not attained to its present efficiency. In fact, pronounced cases of volvulus of the sigmoid practically all died under medical treatment, while according to the latest reports as much as two-thirds of the cases operated on during the attack have been saved. Statistics, however, are of comparatively little value in a consideration of this subject, as the methods employed, and the time when they were employed, vary to such an extent in the hands of various operators, that it is useless to try to draw conclusions from a simple statistical collection of cases reported. But the pathology and the clinical course of these cases have come to be so well understood that there is very little doubt as to what treatment is the most rational one.

Volvulus of the sigmoid used to be discussed as a form of intestinal obstruction, but the discussion has gained infinitely in depth and results, since associated conditions have been duly recognized, which oblige us now to connect volvulus of the sigmoid with a considerable number of closely related pathological changes in the abdominal and pelvic viscera.

As a basis of this discussion, I may relate a case which I operated on some time ago.

*History of the Case.*—B. H. M., male, forty-three years old, machinist, born in Germany. Patient has had typhoid fever thirty years ago, rheumatism in the knee ten years ago, soft chancre five

years ago. In 1892 he noticed discharge of pus and blood from the rectum, and was operated on by Dr. M. for hæmorrhoids. He was better for six months, then began to notice pain in the region of the sacrum, which has continued ever since. In 1899 he was operated on by Dr. F. for hæmorrhoids and a small ulcer. Again he improved for six months. But the pain over the sacrum soon increased again. For seven or eight years patient now and then had nausea, depending more or less on the food ingested. At times the nausea would lead to vomiting of water and bile, never blood. The abdomen was often noticed to be bloated, particularly so during the last month. After the meteorism and the nausea and vomiting have lasted a few days, patient discharged suddenly large quantities of gas and fæcal matter, then watery stools, and, later, hard scybala. Then great relief followed temporarily. Since the last operation patient has not passed any blood, but he has noticed pus and mucus repeatedly, especially after a hard passage. Appetite was always good. Patient lost some six pounds in the last year, present weight is not quite 172 pounds.

Patient complains now of a pulling, burning, and bearing-down sensation over the sacrum and coccyx. This sensation is relieved when he pushes the anus upward.

This history indicated an obstacle to the fæcal passage, probably in the lower bowel, as the vomiting was never copious or excessive or fæcal in character. The presence of pus and mucus in the bowel movements indicated some ulcerative process, also probably low down. The fact that patient felt complete relief at times would speak in favor of a benign obstacle, though the age of the patient was a point in favor of a malignant neoplasm. As blood had not appeared in the stools since the hæmorrhoids had been operated on, I was inclined to exclude malignant neoplasm, because the time since the last hæmorrhoid operation was almost five years. If a malignant neoplasm had been the cause of the patient's passing blood and pus, he would not have survived for that length of time.

The examination of the patient revealed the following status:

Patient is tall, strongly built, muscular. His descriptions of his trouble suggest neurasthenia. Temperature, 99° F. Heart, lungs, liver, spleen, kidneys, glands negative. Urine normal. Anus and rectum normal to palpation and inspection. High up a diffuse infiltration of the paraproctic tissue is to be felt. In the

abdomen a pear-shaped tumor of the size of a child's head is palpated. It is slightly tender to the touch. Its narrow end is in the left iliac fossa, while its rounded extremity reaches towards the right side beyond the median line. There is a tympanitic sound on percussion over it. It is moderately movable. Stomach and intestines are not dilated.

On examination under anæsthesia (February 13, 1904), during the manipulation of the tumor through the abdominal walls a large amount of gas and soft fæces intimately mixed with mucus is evacuated, whereupon the tumor disappears completely.

The location of the tumor, its shape, its mobility, the slight amount of pain over it, the absolutely normal condition of all other parts of the intestinal tract, as far as could be determined by clinical examination, particularly, however, the fact that during manipulation the tumor disappeared after evacuation of a considerable amount of soft fæcal matter with large amounts of mucus and gas,—all this obliged us to make a diagnosis of volvulus of the sigmoid flexure, which had been redressed by the manipulation under anæsthesia. The patient's complaint of a tugging and pulling sensation in the region of the coccyx could be explained as due to a pulling on the rectum, produced by the rectum being wound up, if I may say so, by the twist of the sigmoid. But the fact that this tugging sensation was present not only when the patient had the nausea and vomiting, but more or less constantly; furthermore, the very fact that the nausea and vomiting occurred in spells, between which the patient felt complete relief, indicated that we had to deal with a combination of two processes, one recurrent and one stationary, the first the volvulus of the sigmoid, the second a condition which favors the occurrence and recurrence of the first.

A chronic inflammatory condition of the mesosigmoid leading to the formation of scar tissue in and retraction of the mesosigmoid is found associated with the volvulus (whether as cause or effect will be considered more closely below). This condition I expected to find on operation, and announced my diagnosis accordingly before the operation.

The operation was performed February 15, 1904, under ether anæsthesia, and lasted about twenty minutes. The abdomen was opened in the median line between umbilicus and sym-

physis. Immediately the sigmoid came into view with a very thick mesosigmoid. The latter presented on both surfaces white and glistening stripes of chronic peritonitis, which ramified all over it. The sigmoid was not twisted when the abdomen was opened, but a slight impulse given to the upper half of it sufficed to make it drop over the lower half. Numerous enlarged glands were felt in the mesosigmoid, the base of which was very short. There was considerable accumulation of fat in the mesosigmoid. The sigmoid itself was almost empty. No Graser's diverticula could be seen. The mesosigmoid was attached to the parietal peritoneum of the anterior and lateral abdominal wall by a number of interrupted cumol catgut sutures placed at a distance of about one inch from the sigmoid. The abdomen was closed by four layers of continuous cumol catgut sutures.

A few hours after the operation the patient had a natural bowel movement. During the convalescence the bowels moved several times every day without any laxative. Temperature and pulse remained normal (highest temperature, 99° F., with pulse at 76 on the third day). Patient walked about from the second day on. The incision healed by primary union. Patient left the hospital on March 2.

He was seen again repeatedly since the operation. On May 1 he reports his appetite excellent; his bowels move daily; no mucus in the passages. Some tugging and pulling are still felt over the sacrum. He has resumed his occupation and is able to attend to his duties without difficulty.

The operation and its success have therefore confirmed our diagnosis of the mesosigmoiditis, and make the latter appear fully as important as the temporary and recurrent volvulus.

From a review of the course of similar cases as reported in literature, it becomes evident that many cases never go beyond the initial stages of more or less obstinate constipation, with now and then some nausea or vomiting and pain in the abdomen. But the surgeon is rarely so fortunate as to get the patient for observation and treatment in this early stage, and I suspect that many cases belonging to this class are not recognized, if they do reach the surgeon in this stage. Usually, the surgeon is not called in until a sudden attack of

volvulus, with a more or less pronounced twist of the sigmoid, has obstructed the passage of the fæces completely.

Then the picture of ileus dominates the clinical aspect. The patient is in intense pain, vomits first stomach contents, soon fæcal matter. The bowels are distended, frequently in a very peculiar manner. The rectum is found empty and no passage can be produced. It is not necessary here to go further into the well-known signs of the complete intestinal blocking. It is necessary, however, to mention the peculiar way in which the dilatation of the intestine frequently is manifested in this particular class of obstruction. Two portions of the colon manifest a particular tendency to enlargement, one absolutely characteristic of the volvulus, the other merely indicating that the colon is blocked low down.

The characteristic distention is described as a palpable, often visible tympanitic tumor reaching from the left groin towards the region of the stomach, and representing the dilated sigmoid, which becomes erected, and the loops of which may come into close apposition.

The second dilatation, which sometimes overlaps and obscures the characteristic distention of the sigmoid, is a distention not of the portion of the colon immediately above the sigmoid, as one might expect, but of the cæcum. The cæcum under these circumstances may attain enormous dimensions. It may become as large as a man's thigh, and this may occur while the colon transversum and descendens are practically empty. This distention of the cæcum, of course, takes place only when the ileocæcal valve is absolutely tight. This condition of the cæcum is of the greatest importance, not only because the fatal perforation may take place here instead of in the sigmoid, but because it may lead to great confusion, if the operator is not aware of this peculiar condition and looks for the obstacle in the ascending colon instead of in the sigmoid.

If the volvulus of the sigmoid is not relieved, gangrene of the sigmoid, perforation, and peritonitis lead to the fatal end. But the perforation may occur in the cæcum before the

sigmoid bursts, or ulcerations in the descending colon above the volvulus may perforate and give rise to the fatal peritonitis.

It might be expected that the volvulus would be the more dangerous the more the sigmoid is twisted, that is, that a twist of  $360^{\circ}$  would be more certain to lead to gangrene than a twist of only  $90^{\circ}$ . But the cases reported in literature prove abundantly that such is not the case. Cases with a torsion of only  $90^{\circ}$  have led to gangrene of the whole sigmoid and fatal perforative peritonitis in less than twenty-four hours, while in other cases a twist of  $270^{\circ}$  and more had not produced perforation or even complete gangrene in a much longer time.

This observation necessitated the search for circumstances that might increase or decrease the dangers due to the volvulus itself. The findings in the course of the operations gave satisfactory evidence of such an additional factor. This factor is the mesosigmoiditis, *i.e.*, the chronic inflammatory condition of the mesosigmoid, which has resulted in a cicatricial shrinking of the peritoneal folds of the mesosigmoid as well as of the tissues between the folds. Wherever the cases were observed carefully, wherever the acute changes produced by gangrene and peritonitis allowed of such observations, this chronic retractive process in the mesosigmoid has been found. White stripes of scar tissue branch out over both sides of the mesosigmoid, make it rigid and hard. The retraction peculiar to all scar tissue tends to shrivel up the mesosigmoid. The cicatricial hardening is not limited to the peritoneal folds, but the whole substance of the mesosigmoid loses its soft, pliable condition and becomes hard and stiff like felt, as could be well observed in the case described here. An observation which I have not found recorded in literature, but which was perfectly established in our case, was that of enlarged and hard glands throughout the mesosigmoid.

This cicatricial degeneration of the mesosigmoid elucidates as much as it complicates the course of volvulus of the sigmoid. It is evident that the more scar tissue there is in the substance of the mesosigmoid along and around the blood-

vessels the greater the danger of interference with the circulation. We understand, then, why, with a high degree of mesosigmoiditis, a slight degree of volvulus may lead to rapid gangrene and perforation of the sigmoid, while with a more moderate amount of interference with the circulation in the mesosigmoid even a torsion of  $360^{\circ}$  might not lead to very rapid and complete shutting off of the blood supply of the sigmoid flexure.

The importance of this mesosigmoiditis is further shown by the fact that in a number of cases the symptoms of volvulus were present and the patients died from perforative peritonitis, where there was no real volvulus, but only pronounced mesosigmoiditis (for instance, two cases reported by Kuhn). Here the shrinking of the mesosigmoid shut off the fæcal current as well as the blood circulation, and still the post-mortem showed no volvulus. In our case, also, we found no volvulus at the time of the operation, though the tumor which had been observed two days before the operation, and which had disappeared under manipulation, indicated that volvulus had been present. Still, it is possible that in our case, as well as in Kuhn's two cases and in three similar ones reported by Riedel, there existed no genuine volvulus, but rather a kink of the sigmoid produced by the shrinking of the mesosigmoid. The forms and shapes assumed by the mesosigmoid in this process of chronic inflammation and shrinking vary a great deal. While in some cases the mesosigmoid is fairly well spread out, so that the bands of cicatricial tissue are seen branching out all over it, in other cases the retraction of the shrinking connective tissue has brought the two halves of the sigmoid into such close approximation, that they lie perfectly parallel to each other in the shape of a double-barrelled gun. Besides, bands may take their course from one part of the sigmoid or mesosigmoid to other points on the bowel or the mesentery.

Gersuny describes a special band at the point where the colon descendens passes into the sigmoid. He calls this band a typical one, with a typical course running across the outer fold of the mesosigmoid. Gersuny states that this fold or

band is the cause of symptoms long before volvulus occurs. Pain in the lower part of the abdomen on both sides is attributed by him to this typical band.

Enough, I think, has been said to demonstrate the importance of this cicatricial retraction of the mesosigmoid in itself. All authors agree that it favors greatly the occurrence of volvulus by approximating the fixed points of the sigmoid. As a matter of experiment, I gave the sigmoid a slight twist in our case, when the abdomen was open, and it took only a very slight push to make the proximal end of the sigmoid fall forward and over the distal end. This experiment again favored the theory of the causation of volvulus by the mesosigmoiditis, and furthermore increased the probability that in our case we had to deal with a recurrent volvulus, not merely a kink of the sigmoid.

While the association of mesosigmoiditis with volvulus is generally accepted, the question as to which is the primary affection is not so readily decided. The fact that mesosigmoiditis has been found alone and unassociated with volvulus, and that all well observed cases of volvulus have been found associated with mesosigmoiditis, might be considered sufficient proof of the primary existence of the mesosigmoiditis. But it might be urged that a condition of recurrent volvulus of the sigmoid would tend to produce such inflammatory changes in the bowel that the mesentery would readily be affected and take part in the inflammation, and subsequently be subject to cicatricial changes. On the other hand, it is well to point out that volvulus without pathological conditions in the mesentery is not likely to occur; though it is true that Koch, for instance, describes congenital anomalies in the mesentery which might lead to volvulus as a secondary and inflammation and cicatrization of the mesosigmoid as a tertiary condition. The varieties of incomplete or abnormal development of the mesentery of the sigmoid are as numerous as the deviations from the normal in other parts of the bowel. This must lead us to a consideration of the possible causes of the mesosigmoiditis apart from the question of volvulus.



Chronic inflammatory changes of the mesentery occur in many parts of the intestinal tract. They may be associated with volvulus, as, for instance, in the mesentery of the small intestine (Philipowicz), or may occur without it, where the anatomical arrangement does not favor the occurrence of a volvulus, as, for instance,—and very frequently,—in the meso-appendix. The chronic parametritis atrophicans described by Freund,—a condition so long regarded as something extraordinary and hard to find or observe,—I consider to be analogous. In fact, I should call it the shrinking mesenteritis of the uterus, and would thereby deprive it of its isolated position in pathology and bring it closer to our understanding.

Excepting two specimens reported by Riedel, no microscopic examinations of the mesosigmoiditis are to be found. But changes identical in macroscopical aspect occur frequently in the meso-appendix, and are easily demonstrated there. The pathology is that of a newly formed and shrinking connective tissue with more or less round cell infiltration. We cannot be far from the truth in assuming that the cause is very much the same in the mesosigmoid as in the meso-appendix. In the appendix, my researches (to be published soon) have taught me that very minute ulcerative changes afford ready entrance to infection. This favors inflammatory affection of the neighboring lymphatic structures in the meso-appendix. I do not know anything about small ulcerations in the sigmoid, because sigmoids are not removed and examined fresh in such numbers as appendices.

But some recent researches of Graser's have demonstrated a possible cause of the mesosigmoiditis in the spurious diverticula which he found. Graser met these diverticula in the sigmoid in ten out of twenty-eight cases examined, proving thereby that the sigmoid is a seat of predilection for the formation of the diverticula. In early stages, these diverticula are lined with epithelium and covered by the muscularis mucosæ, and partly by the circular muscular layer, while the longitudinal layer is absent over them. They follow the paths reserved for the blood-vessels in their course through the muscular layer

in the same way as similar formations which I have demonstrated in the Fallopian tubes and in the gall-bladder. The diverticula of the bowel are usually arranged along the mesenteric border, as here the vessels enter and leave. Their formation, according to Graser, is favored by stagnation of fæcal matter in the bowel and by venous stasis in the vessels, whereby the paths of the blood-vessels, or emissaries, as Graser terms them, become widened. These diverticula often become the seats of ulcerative changes, become adherent to neighboring organs, may lead to perforation into them. In this way, for instance, perforation from the sigmoid into the bladder may occur leading to the passage of fæces through the bladder or of urine through the rectum.

In the earlier stages, before the diverticula have become large, when they have just begun to show small ulcerations, an inflammatory affection of the mesosigmoid could readily be understood as a consequence of such multiple ulcerations. It is safe to prophesy that this association of diverticular ulceration and mesosigmoiditis will be frequently discovered in the near future. In the case described above, I looked for these diverticula, but, owing to the thickened and opaque condition of the mesosigmoid, it was impossible to ascertain whether diverticula were present or not.

Besides the diverticula minute ulcerations might be suspected to occur in the sigmoid, particularly where congenital anomalies favor stagnation of fæcal matter in this organ. The lining epithelium of the bowel is now well known not to afford the complete protection against infection which we used to attribute to it. The investigation of the appendix vermiformis has largely destroyed the confidence which we used to place in the perfection of the protective fence arranged against the septic contents of the alimentary tract.

Ulcerations in neighboring parts of the bowel are known to be able to produce the same condition of mesosigmoiditis as described in cases of volvulus. A case which I operated on the same morning as the case which is the subject of this report, illustrated this very beautifully. I had to perform colostomy

on a patient with multiple fistulas in ano, almost impermeable stricture of the rectum, and ulceration of the rectum above the stricture. When I pulled up the sigmoid, typical mesosigmoiditis was found to be present, though there was no question of volvulus in this case. But the inflammatory and cicatricial hardening of the tissues, which existed around the ulcerated rectum, had extended to the mesentery of the sigmoid. I did not see any diverticula, and the mesosigmoiditis was not so extensive as it was in the case of volvulus. Still, the white bands spreading and branching over the mesosigmoid were absolutely typical.

This case of mesosigmoiditis after rectal ulceration with its extension all around the stricture and deep into the tissues of the perineum seemed to offer a further explanation of the tugging and burning pain which the volvulus patient complained of. He also presented a thickening of the tissues surrounding the rectum high up, which could be discovered by rectal palpation, and which may have originated in the small ulcer for which he was operated on by Dr. F. The hardening of the paraproctic tissue, which Freund, for instance, in his description of the parametritis chronica atrophicans mentions also, may easily be conceived to be the cause of pain in consequence of pressure on the nerves and ganglia of this region. This hardening itself cannot be cured by any treatment, and may explain why the volvulus patient is not free from disagreeable sensations to this day. Though it is possible to restore normal evacuations of the bowel by operation, it is not possible to cure by operative or other means the chronic induration of the connective tissue. I have observed this same difficulty in a case of recurrent volvulus which I operated on in 1900. The patient at first continued to complain of disagreeable sensation in his abdomen, but he is well and hearty now and attends daily to his hard work. It may be assumed that with the regulation of the action of the bowels, produced by the operation for the volvulus, the previously existing ulcerations in the bowel may heal, and, no further infectious material being carried into the

mesentery, the inflammatory condition of the mesentery may quiet down and the patient recover, with the old scar tissue in the mesentery not troubling him any further or even softening up. In the same way we see indurated cicatricial tissue around ulcers in other parts of the body heal and grow soft after the ulcer is healed, as, for instance, in cases of varicose ulcers of the leg.

These considerations and the clinical observations mentioned prove that mesosigmoiditis in itself is a pathological entity deserving our attention. Whether it leads to volvulus or not is perhaps a minor question. It may do so or it may not. Its treatment, at any rate, is inseparable from that of the volvulus, and a brief discussion of the methods to be used in the absence of acute volvulus may be permitted here.

The treatment which was carried out in our case was that first advised by Roser and Roux. It is important to remember that Roux himself had to operate three times on one case, because the volvulus returned after the first two operations. Roux attributes this recurrence to insufficient extent of the suture, and advises to attach the mesosigmoid in its entire length. It is necessary to place the suture so that no artificial deep recess behind the sigmoid is formed, which might give rise to an internal strangulation. Therefore the lower part of the sigmoid has to be attached to the lateral rather than the anterior wall in order to prevent this formation of a pocket. It is easier and safer to attach the mesosigmoid to the anterior abdominal wall rather than to the posterior wall on account of the important structures of the posterior wall, which might be injured or interfered with by the sutures (ureter, iliac arteries, and veins).

Riedel's method of dissecting out the cicatricial bands has been carried out by him only. It would seem that any dissection of these cicatricial masses would only lead to the formation of new scars and favor more adhesions.

The resection of the sigmoid in cases of mesosigmoiditis, as first advised by Obalinsky and as carried out during the interval by von Eiselsberg and Steinthal, is the most radical

method, which ought to be reserved for the most pronounced cases of shrinking of the mesosigmoid, or cases where the shrinking and the recurrent volvulus are complicated by irreparable changes in the substance of the bowel, such as, for instance, would be represented by Graser's diverticula, or where the shrinking of the mesosigmoid has advanced to the formation of a "double-barrelled" sigmoid, if such a condition should ever be observed outside the acute volvulus. A Roux operation, even with the addition of Riedel's procedure on the bands, would evidently be impossible, and certainly insufficient in this condition of the "double-barrelled" sigmoid.

Anastomosis of the two ends of the sigmoid close to its points of attachment as advised by Braun would seem to favor recurrence of the volvulus, as it would tend to render the line of attachment of the sigmoid extremely small.

Entero-anastomosis between cæcum and descending loop of the sigmoid, the method of necessity sometimes in acute volvulus, is objectionable in the absence of acute volvulus, because the anastomosed parts of the bowel course free across the abdominal cavity after this operation, and thereby favor formation of knots and strangulation of loops of intestine, unless the operation be combined with a Roux attachment.

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